■ DIGITAL TRANSFORMER RATIOMETER

8510

ENGLISH

User Manual

AEMC® INSTRUMENTS

Statement of Compliance

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments certifies that this instrument has been calibrated using standards and instruments traceable to international standards.

We guarantee that at the time of shipping your instrument has met its published specifications.

An NIST traceable certificate may be requested at the time of purchase, or obtained by returning the instrument to our repair and calibration facility, for a nominal charge.

The recommended calibration interval for this instrument is 12 months and begins on the date of receipt by the customer. For recalibration, please use our calibration services. Refer to our repair and calibration section at **www.aemc.com**.

Serial #: _____

Catalog #: 2136.50

Model #: 8510

Please fill in the appropriate date as indicated:

Date Received: _____

Date Calibration Due: _____

AEMC® INSTRUMENTS

Chauvin Arnoux®, Inc.
d.b.a AEMC® Instruments
www.aemc.com

Table of Contents

1. INTRODUCTION 3

1.1 International Electrical Symbols 4

1.2 Definition of Measurement Categories 4

1.3 Receiving Your Shipment 5

1.4 Ordering Information 5

1.4.1 Accessories and Replacement Parts 5

2. PRODUCT FEATURES 6

2.1 Description 6

2.2 Control Features 8

2.3 Cable Identification 9

3. SPECIFICATIONS 10

3.1 DTR® 8510 Specifications 10

3.2 Battery Charger Specifications 12

4. DISPLAY FUNCTIONS 13

4.1 Program Flow 13

4.2 Top Level Menu 13

4.3 Configure Instrument 14

4.3.1 Set Clock 16

4.3.2 Setup Nameplate 17

4.3.3 Select Test Type 20

4.3.4 Select Test Mode 20

4.3.5 Select Storage Mode 21

4.3.6 Select Filter 22

4.3.7 Erase Memory 23

4.3.8 Select Language 24

4.3.9 Restoring Factory Defaults 25

4.4 Recall Data 26

5. OPERATION 28
5.1 Power Up 28
5.2 Running a Test 29
5.2.1 VT/PT Test 29
5.2.2 Storing the Measurement Record (Manual/Auto) 31
5.2.2.1 Manual Mode 31
5.2.2.2 Auto Mode 32
5.2.3 VT/PT Excitation Current 32
5.2.4 VT/PT Continuity Test 33
5.2.5 CT Test 33
5.3 Tips for Making Precise Ratio Measurements 35
5.4 Ratio Test - 1:1 36

6. CONNECTIONS 37
6.1 Connection Diagrams 37
6.2 Polyphase Connections 38

7. DATAVIEW® SOFTWARE 39
7.1 Installing DataView® 39
7.2 Opening the Control Panel 43
7.3 Using the Control Panel 45
7.4 Configuring the DTR® 8510 47
7.5 Running a Test 49
7.6 Downloading a Test 50
7.7 Saving the Measurement Records 51
7.8 Report Generation 51

8. MAINTENANCE 53
8.1 Charging the Batteries 53
8.2 Cleaning 56

APPENDIX A: DISPLAY MESSAGES 57
Repair and Calibration 60
Technical and Sales Assistance 60
Limited Warranty 61
Warranty Repairs 61

INTRODUCTION

⚠ WARNING ⚠

These safety warnings are provided to ensure the safety of personnel and proper operation of the instrument.

- This instrument is protected from accidental voltages of not more than 50V with respect to earth. The guaranteed level of protection of this equipment may be compromised if used in a manner not specified by the manufacturer.
- Read the instruction manual completely and follow all safety information before attempting to use or service this instrument.
- The Digital Transformer Ratiometer DTR® Model 8510 is designed for use on ***de-energized ("dead")*** transformers only. Make sure the test sample is completely disconnected from AC power and is ***fully discharged***.
- Only qualified personnel should use the DTR® 8510 .
- The DTR® 8510 must not be used in a manner in which any of its components (including test cables) are relied upon to provide protection from electric shock. No high voltage insulation/ protection is provided by any component of the DTR® 8510. **Always make sure the circuit is fully discharged before attaching any test cables.**
- Do not touch, adjust, or reposition test cables while the DTR® is conducting a test.
- Use caution on any apparatus: potentially high voltages and currents may be present and pose a shock hazard.
- Safety is the responsibility of the user.
- Only use the charging unit supplied with the instrument to recharge the battery.
- Never open the instrument while it is connected to AC power or when test cables are connected to transformers, equipment, circuits, etc.

1.1 International Electrical Symbols

	Signifies that the instrument is protected by double or reinforced insulation.
	CAUTION - Risk of Danger! Indicates a WARNING and that the operator must refer to the user manual for instructions before operating the instrument in all cases where this symbol is marked.
	Risk of electric shock. The voltage at the parts marked with this symbol may be dangerous.
	Ground/Earth
	Important instructions to read and understand completely.
	Important information to acknowledge.
	Battery
	Fuse
	USB socket
	Compliance with the Low Voltage & Electromagnetic Compatibility European directives (73/23/CEE & 89/336/CEE)
	In the European Union, this product is subject to a separate collection system for recycling electrical and electronic components In accordance with directive WEEE 2002/96/EC

1.2 Definition of Measurement Categories

CAT I: For measurements on circuits not directly connected to the AC supply wall outlet such as protected secondaries, signal level, and limited energy circuits.

CAT II: For measurements performed on circuits directly connected to the electrical distribution system. Examples are measurements on household appliances or portable tools.

CAT III: For measurements performed in the building installation at the distribution level such as on hardwired equipment in fixed installation and circuit breakers.

CAT IV: For measurements performed at the primary electrical supply (<1000V) such as on primary overcurrent protection devices, ripple control units, or meters.

1.3 Receiving Your Shipment

Upon receiving your shipment, make sure that the contents are consistent with the packing list. Notify your distributor of any missing items. If the equipment appears to be damaged, file a claim immediately with the carrier and notify your distributor at once, giving a detailed description of any damage. Save the damaged packing container to substantiate your claim.

1.4 Ordering Information

Digital Transformer Ratiometer Model 8510 (115V)..... **Cat. #2136.50**

Includes NiMH batteries (installed), 115V power cord, set of 15 ft cables in a carrying bag, an external battery charger (90-264VAC 50/60Hz), DataView® software CD-ROM, warranty card and user manual.

1.4.1 Accessories and Replacement Parts

Fuse - set of 5, 0.5A 250V (5x20mm, Slow Blow)..... **Cat. #2118.53**

Fuse - set of 5, 4A 125V (5x20mm, Slow Blow)..... **Cat. #2118.55**

Lead - Set of 2, 30 ft..... **Cat. #2136.76**

Lead - Replacement set of 2, 15 ft ..... **Cat. #2136.77**

Battery - Replacement set of 2, 12V NiMH rechargeable.... **Cat. #2136.78**

Replacement Battery Charger..... **Cat. #2136.79**

Order Accessories and Replacement Parts Directly Online

*Check our Storefront at **www.aemc.com** for availability*

PRODUCT FEATURES

2.1 Description

The Digital Transformer Ratiometer DTR® Model 8510 is a lightweight, rugged, portable instrument designed for onsite testing of power, potential and current transformers.

Operation of the DTR® 8510 is fully automatic. No user calibration, range selection, hand cranking or tedious balancing is required.

During each test cycle, the DTR® 8510 automatically checks for:

- H/X lead reversal
- Continuity of tested circuits/windings (if configured)
- Short circuit conditions (high current)

Upon completion of a test cycle, the DTR® 8510 displays:

- **Turns Ratio:** The ratio of the primary to secondary voltage at the transformer terminals due to test excitation.
- **Excitation Current:** The RMS excitation current in the H winding due to test excitation during negligible loading of the associated X winding.
- **Polarity:** Indicates the polarity (phase) of X relative to H.
- **Deviation:** Indicates the deviation from nameplate ratio in %.

Turns Ratio, Excitation Current, Polarity and Deviation are useful parameters in diagnosing and predicting a variety of faults that occur in power, potential and current transformers.

The DTR® 8510 will display the following messages:

- Incorrect Lead Connections
- H/X Reversal (accidental step-up misconnection)
- Short (excess excitation current)
- Open Circuits
- Circuit Continuity
- Low Battery

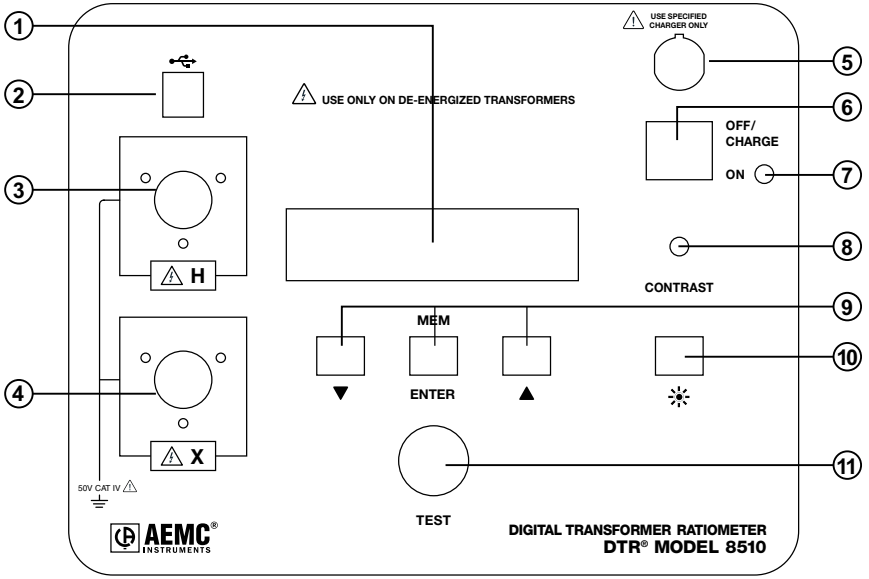
In addition, the DTR® 8510 allows the user to store the data in automatic or manual mode after each test eliminating the need to write down the test results. Each measurement record is date and time stamped providing complete test information.

The user can also save Nameplate voltages and compare the results as the data is being gathered. The data can later be downloaded to a PC and analyzed using the DataView® software package which is included with the product.

DataView® allows full control of the instrument.

The DTR® 8510 utilizes an advanced, low-voltage, step-down measurement technique in which the high voltage “H” windings are subjected to test excitation. This results in greater operator safety and the ability to test a much wider array of transformer types and sizes.

2.2 Control Features

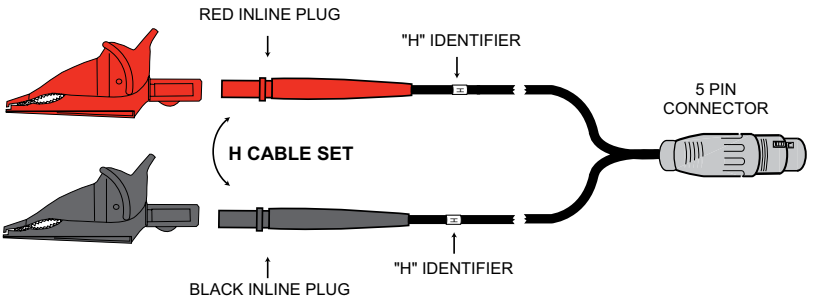


1. **Display:** Displays data, status and control features of the instrument.
2. **USB Connector:** Allows connection to a computer for instrument configuration set-up and status check, downloading of the stored data using the DataView® software and running a test..
3. **High-side "H" Cable Connector (primary):** Connection for the primary side of the transformer.
4. **Low-side "X" Cable Connector (secondary):** Connection for the secondary side of the transformer.
5. **Battery Charge Input Connector:** Allows the smart charger to charge the batteries.
6. **Power Switch:** Turns the instrument ON or OFF (if the charger is not connected). If the charger is connected, the batteries charge in OFF/ CHARGE position.
7. **Operation and Battery Low Indicator:** Green LED indicates that the instrument is on and blinks when the batteries are getting low (<12V). The instrument will completely shut down when the batteries are below 8.7V.

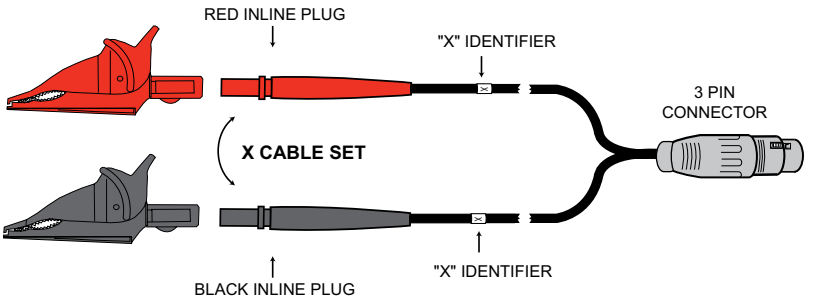
8. **Display Contrast Adjustment:** Allows adjustment of the display contrast.
9. **Function Keys:** Allows navigation of the menu and functions of the instrument.
10. **Backlight (☀) Control Button:** Turns the display backlight ON or OFF.
11. **Test Button:** Runs the selected test when pressed and released.

2.3 Cable Identification

Primary (H) Cable:



Secondary (X) Cable:



Each cable is clearly marked. The Primary (H) cable has a 5-pin connector and the Secondary (X) cable has a 3-pin connector. They cannot inadvertently be connected incorrectly.

SPECIFICATIONS

Reference Conditions: 23°C ± 5°C (30 to 50% RH) range. Add 25ppm/°C from -10° to 18°C and 28° to 50°C to all accuracy specifications. No external electrical or magnetic fields. Output current ≤150 mA for VT/PT and ≤ 50mA for CT. Calibration cycle is 1 year.

3.1 DTR® 8510 Specifications

DTR® 8510		
ELECTRICAL		
Ratio Range (VT/PT)	Autoranging: 0.8000 to 8000:1	
Accuracy (VT/PT)	**Ratio Range**	**Accuracy (% of Reading)**
	0.8000 to 9.9999	± 0.2%
	10.000 to 999.99	± 0.1%
	1000.0 to 4999.9	± 0.2%
	5000.0 to 8000.0	± 0.25%
Ratio Range (CT)	Autoranging: 0.8000 to 1000.0	
Accuracy (CT)	**Ratio Range**	**Accuracy (% of Reading)**
	0.8000 to 1000.0	± 0.5%
Excitation Signal	VT/PT Mode: 32Vrms max CT Mode: Auto Level 0 to 1A, 0.1 to 4.5Vrms	
Excitation Current Display	Range: 0 to 1000mA Accuracy: ± (2% of Reading + 2mA)	
Excitation Frequency	70Hz	
Display	Dual line alpha-numeric LCD, 16x2 characters with contrast adjustment and backlight control. Day/night visible.	
Measurement Method	In accordance with IEEE Std C57.12.90™-2006	
Power Source	Two 12V, 5x2, 1650mAH NiMH rechargeable battery packs	
Battery Life	Up to 10 hrs of continuous operation. Low battery indication.	
Battery Charger	Universal input (90 to 264Vrms input) smart recharger	
Charging Time	<4 Hrs	
Data Storage	99 objects with 99 tests each	
Date/ Time	Battery-backed, Real-time clock	

Communication	USB. 2.0 compliant, optically isolated, 115.2 KB
Software	DataView® analysis software included
MECHANICAL	
Dimensions	10.70 x 9.76 x 5.12" (272 x 248 x 130 mm)
Weight	8.1 lbs (3.7kg)
Connection	XLR connectors
Leads	15 ft (4.6m) H & X shielded with color-coded large industrial alligator clips in carrying bag
Enclosure	Heavy duty Polypropylene case, UL 94 V0
Vibration	IEC 68-2-6 (1.5mm to 55Hz)
Shock	IEC 68-2-27 (30G)
Drop	IEC 68-2-32 (1m)
Index of Protection	IP 40 (Instrument lid open) per EN 60529 IP 53 (Instrument lid closed) per EN 60529
ENVIRONMENTAL	
Operating Temperature	14° to 122°F (-10° to 50°C)
Storage Temperature	-4° to 140°F (-20° to 60°C)
Relative Humidity	10 to 85% RH @ 35°C
Altitude	Up to 2000 meters (6560 ft)
SAFETY	
Safety Rating	EN 61010-1; 50V CAT IV; Pollution Degree 2
Double Insulated	Yes
CE Marking	Pending

Specifications are subject to change without notice.

3.2 Battery Charger Specifications

DTR® 8510 BATTERY CHARGER	
ELECTRICAL	
No-load Voltage	41V ±2V
Fast Charge Current	0.9A ±70mA
Top-off Charge	130mA ±40mA
Charge Termination Options	-dV, dT/dt
Input Rating	90 to 264VAC/47 to 63Hz
Maximum Output Power	35W
Trickle Charge Current	50mA ±25mA
Leakage Current (from battery with mains off)	<1mA
MECHANICAL	
Dimensions	4.22" x 2.64" x 1.44" (107 x 67 x 36.5mm)
Weight	0.55 lbs (250g)
Input Connection	2-pin IEC 320-C7
Output Connection	NiMH: 3 PIN DIN
ENVIRONMENTAL	
Operating Temperature	-4 to 104°F (-20° to 40°C)
SAFETY	
Insulation Class	II
Electrical Safety Approval	EN 60601-1, EN 60950, EN 60335-2-29
EMC Standards	EN 61000-6-3 (Emission), EN 61000-6-1 (Immunity)

Specifications are subject to change without notice.

DISPLAY FUNCTIONS

4.1 Program Flow

In order to use the instrument efficiently, it is important to understand the program flow.

- Pressing the ▼ and ▲ keys simultaneously allows going up one level (if there is a level) in the program flow.
  (Vertical navigation moving up a level).
- Pressing the ▼ or ▲ key allows navigation within the level.
  (Horizontal navigation).
- Pressing the **ENTER** key allows the selection and display of choices one level below (if there is a level) in the program flow.
  (Vertical navigation moving down a level).

4.2 Top Level Menu

The instrument has a top level control as shown in Fig. 4-1.

The user can navigate around the ring by pressing the ▼ or ▲ key.

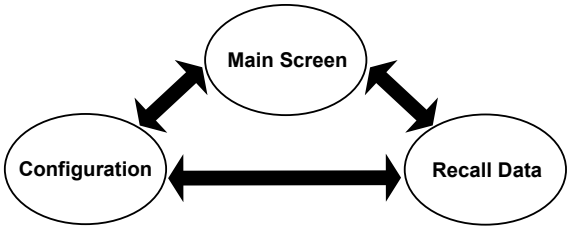


Figure 4-1

Once the instrument is turned on, it initializes and then displays the Main Screen:

Figure 4-2

- **Main Screen:** Displays the Test Type, Test Mode, Filter [Fast (F), Normal (N) or Slow (S)], Storage Mode [Auto (A) or Manual (M)] and the Present Nameplate values (if enabled).
- **Configure Instrument:** Configures the instrument (see § 4.3).
- **Recall Data:** Stored data can be selected and displayed (see § 4.4).

NOTE: The program flow is two or three levels deep at various points. The available choices for a level can be viewed by pressing the ▼ or ▲ keys.

The **ENTER** key is used to select the following functions:

- Enter configuration menu.
- Enter Recall Data menu.
- Initiate storage of test results, accept location parameters and store the Measurement Record.

4.3 Configure Instrument

With the display showing *Configure Instrument*, press the **ENTER** key. The configuration ring (see Figure 4-4) can be navigated around using the ▲ or ▼ key.

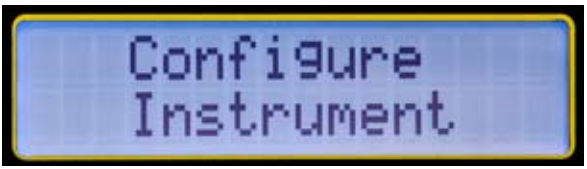


Figure 4-3

- **Set Clock:** Allows the setting of Time and Date.
- **Setup Nameplate:** Allows selection and editing of Present Nameplate voltages or ratios. Predefined ratios can only be edited through DataView®.
- **Select Test Type:** Allows the selection of Test Type (VT/PT or CT).
- **Select Test Mode:** Allows selection of the Test Mode (Ratio or Continuity/ Ratio in VT/PT Mode).
- **Select Storage Mode:** Allows the selection of data storage mode (Automatic or Manual).

- **Select Filter:** Allows selection of filter (Fast, Normal, Slow). See § 4.3.6.
- **Erase Memory:** Allows deletion of all the stored measurement records
- **Select Language:** Allows selection of language on the display (English, French, German, Italian, Spanish, Portuguese)

NOTE: To move one level up and return to *Configure Instrument*, press the ▼ ▲ keys simultaneously.

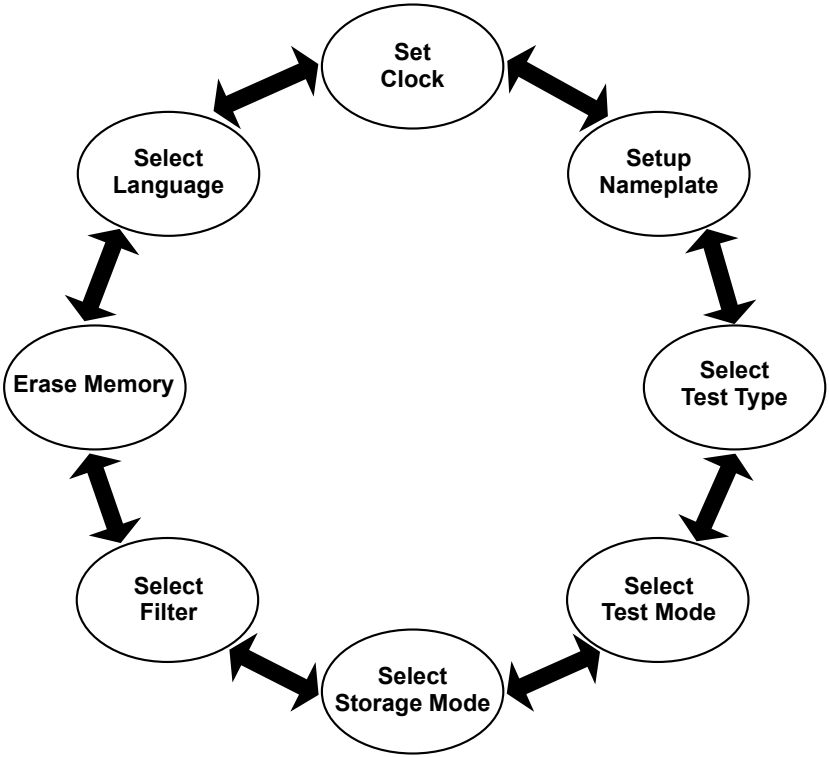


Figure 4-4

4.3.1 Set Clock

1. Within the top level of *Configure Instrument*, press the ▼ or ▲ key until *Set Clock* appears on the display, then press **ENTER**.

Figure 4-5

The *Set Clock* configuration allows you to format the following:

Date Format: Allows the formatting of the date.
(MM/DD/YY, DD/MM/YY, YY/MM/DD).

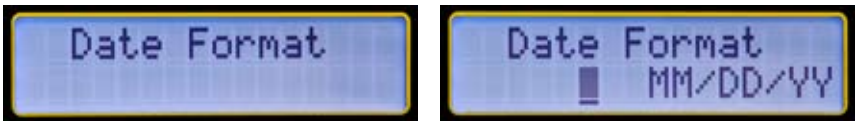


Figure 4-6

Time Format: Allows the formatting of the time (12 or 24 hours).

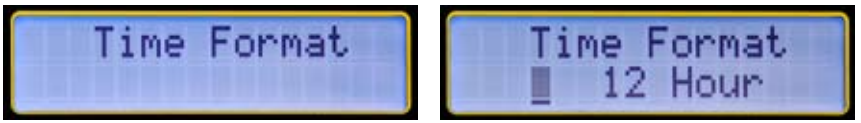


Figure 4-7

Set Date and Time: Allows the setting of the date and time in the selected format.

Note: Time must be set in the 24-hour format. It will be displayed with AM/PM if the 12-hour format is chosen.

Figure 4-8

Example: To set the time to 2:50 PM, set the hour to 14 and the minutes to 50.

To maneuver between the *Set Clock* configuration settings, perform the following:

1. Within the top level of *Configure Instrument*, press the ▼ or ▲ key until *Set Clock* appears on the display, then press **ENTER** to configure the date.
2. Use the ▼ or ▲ keys to view the choices. Press **ENTER** to make a selection. Once the format is selected, the display returns to *Date Format*.
3. Use the ▼ or ▲ keys to navigate to the other date and time options or press both ▼▲ keys together to return to the top level.

4.3.2 Setup Nameplate

Nameplate values are primary and secondary voltages (or ratios) associated with a given transformer. This information is available on the Nameplate of the transformer. The measured results will be compared with selected (edited) Nameplate values and Deviation will be displayed and stored in % relative to these values.

The DTR® 8510 allows the storage of 10 Nameplate voltages or ratios which can be individually selected for a given test.

NOTE:

- The Nameplate list of up to 10 transformers can be written to and saved only using DataView® software. The values in the list can be edited for use but cannot be saved from the front panel.
- The keys on the front panel can select any one of the 10 transformer Nameplate values. Once the transformer values are selected, they can be edited to a new value using the ▼, ▲ and **ENTER** keys. When the new values are selected (even if they are not edited to new values), it becomes the Present Nameplate and will be used for all subsequent VT/PT and CT measurements. Deviation will be reported and stored using these values.
- The Present Nameplate values will be retained in memory even if the instrument is turned OFF and turned ON. However, it will not be saved in the list from which it was originally selected.
- The user can select another Nameplate from the list in the future and may or may not edit the values. As soon as the new Nameplate values are selected (and/or edited), it becomes the new Present Nameplate.

- The Present Nameplate values are displayed in the Main Screen.
- Each Measurement Record will record the Present Nameplate along with other associated parameters and will be available when the data is downloaded.
- The Ratio of the nameplate values must be between 1 and 32767.
- The Nameplate needs to be enabled. If the Nameplate is not enabled, the Deviation % will not be reported after the measurements. Subsequently, the stored values will not have Nameplate and Deviation % in the Measurement Record.

NOTE: The Main Screen will display the Present Nameplate only if it is Enabled. If it is not Enabled, it will display "---" for Primary and Secondary.

To configure the settings for the Nameplate, perform the following:

1. Within the top level of *Configure Instrument*, press the ▼ or ▲ key until *Setup Nameplate* appears on the display, then press **ENTER**.

Figure 4-9

2. The display will show *Enable* with *Yes* and *No* choices. Press the ▼ key to select *Yes* (Enable Nameplate).

Figure 4-10

3. The display will now show the following screen:

Figure 4-11

4. Select *List* by pressing the ▼ key. The list can then be scrolled from 0 to 9 Nameplate values by using the ▼ or ▲ key. Select the desired Nameplate by pressing **ENTER**. The display will return to *Setup Nameplate*.

Figure 4-12

5. Press **ENTER**, then Yes (▼) on Enable.

6. Select *Edit* by pressing the ▼ key. The values in the Present Nameplate can be edited digit by digit by selecting each digit with the ▼ or ▲ and then pressing the **ENTER** key. When the last digit on the Secondary is selected, the display returns to *Setup Nameplate*.

Figure 4-13

NOTE:

- Selecting one transformer from the list will replace the values in the Present Nameplate immediately. The values can then be changed in the *Edit* mode if needed.
- Selecting *Edit* will allow the user to modify the values in the Present Nameplate.
- The *Edit* process changes the values in the Present Nameplate only. The values previously stored would remain the same. The stored *List* values can only be changed in DataView®.

- In order to write the Present Nameplate value, you must press **ENTER** until *Setup Nameplate* is displayed. Otherwise, the ratio will not be entered. If the up/down arrows are pressed after setting the ratio, then it performs a cancel operation and the changes will not be saved.

REMEMBER: In order to move one level up and return to *Configure Instrument*, press the ▼ ▲ keys simultaneously.

4.3.3 Select Test Type

1. From the top level of *Configure Instrument*, press the ▼ or ▲ key until *Select Test Type* appears on the display, then press **ENTER.**

Figure 4-14

2. Select *VT/PT* or *CT* using ▼ or ▲ and press **ENTER**. The display will return to *Select Test Type*.

NOTE: Once the Test Type is selected, it is retained until changed by the user. If the instrument is turned OFF and turned ON, the Test Type will be the same as last selected.

4.3.4 Select Test Mode

1. From the top level of *Configure Instrument*, press the ▼ or ▲ key until *Select Test Mode* appears on the display, then press **ENTER.**

Figure 4-15

2. Select *Ratio* or *CONT/Ratio* test using ▼ or ▲ and press **ENTER**. The display will return to *Select Test Mode*.

CONT/Ratio: Performs a Continuity test followed by Ratio test only in VT/PT. Continuity test is not available (N/A) in CT mode.

Ratio test: Performs only the Ratio test in the VT/PT or CT mode.

NOTE: Test Mode can also be selected from the Main Screen by pressing ENTER, which toggles the selection of CONT and Ratio.

4.3.5 Select Storage Mode

1. From the top level of *Configure Instrument*, press the ▼ or ▲ key until *Select Storage Mode* appears on the display, then press **ENTER.**

Figure 4-16

2. Select *Auto* or *Manual* using ▼ or ▲ and press **ENTER**. The display will return to *Configure Instrument* > *Select Storage Mode*.

NOTE:

- In *Manual* mode, the user has a choice at the end of a test whether to store the Measurement Record or not. The user also has a choice of where to store the Measurement Record. So it is possible for the user to store the Measurement Record at various locations leaving gaps in the storage memory map.

  All Measurement Records will be downloaded no matter where they are stored in the memory.

- In *Auto* mode, the instrument will store the Measurement Record at the end of a test starting with the first available location. All the subsequent Measurement Records will be stored sequentially.

  If the previously stored Measurement Record is encountered, the Auto store mode will skip over and store the new Measurement Record in the next available location.

NOTE: If the DTR® 8510 is connected to a computer, Auto mode will be disabled. The Measurement Record will not be saved in the instrument but will be sent to the computer.

4.3.6 Select Filter

1. From the top level of *Configure Instrument*, press the ▼ or ▲ key until *Select Filter* appears on the display, then press **ENTER.**

Figure 4-17

2. Select *Fast, Normal* or *Slow* using ▼ or ▲ and press **ENTER**. The display will return to *Configure Instrument* > *Select Filter*.

NOTE: The DTR® 8510 offers the user a choice of three digital filters for measurement, depending upon the external electrical noise. These are sophisticated digital filters in the design which offer maximum noise rejection for repeatable measurements.

Digital Filters:

The digitization of signal is done with Sigma-Delta (Σ-Δ) modulator. The output is a high frequency bit stream which is fed to a digital filter. The filtering of signal is performed with sophisticated sinc (Sinx/x) filter. The primary function of the filter is to remove the quantization noise introduced during the modulation process.

The filter limits the band of the allowed frequency to significantly lower than one-half of the frequency of the modulator itself. This reduces the 1-bit output of a comparator in a band-limited, very low noise output. The cut-off frequency and the decimated data rate are appropriately programmed in the internal registered and the output is arithmetically averaged to provide an accurate final answer.

High decimation results in lower noise but at a slower throughput rate. The calculation of arithmetic mean is a quick process at high clock speeds of the microprocessors.

The DTR® 8510 improves the quality of measurements in the following ways:

(1) Low noise electronics
(2) Shielded electronics and cables.
(3) Differential measurements to reduce common-mode effects.
(4) Ratiometric calculations to reduce dynamic errors.

VT/PT

	Fast	Normal	Slow
Approx Measurement Time	6.5 S	9 S	19 S
Uses	Electrically Quiet Environment	In Most Applications	Electrically Very Noisy Environment

CT

	Fast	Normal	Slow
Approx Measurement Time	14 S	16 S	43 S
Uses	Electrically Quiet Environment	In Most Applications	Electrically Very Noisy Environment

4.3.7 Erase Memory

1. Press the ▼ or ▲ key until *Erase Memory* appears on the display, then press **ENTER.**

Figure 4-18

2. Select *Yes* or *No* using ▼ or ▲ and press **ENTER**. The display will return to *Erase Memory*.

CAUTION: Once the memory is erased, the stored data **cannot be recovered**. Download the data, if desired, before the Erase Memory function is executed.

4.3.8 Select Language

1. Press the ▼ or ▲ key until *Select Language* appears on the display, then press **ENTER.**

Figure 4-19

2. Select a language using ▼ or ▲ and press **ENTER**. The display will return to *Select Language*.

The following languages are available:

- English - Italian
- French - Spanish
- German - Portuguese

Once the language is chosen, all the menu items, error messages etc. will be displayed in this language. The configuration retains the language if the instrument is turned OFF and then turned ON.

NOTE: The language can also be selected immediately at start up. Press and hold the **TEST** button while turning the unit ON. After initialization, the instrument will display the currently active language. Release the **TEST** button. The desired language can now be selected.

4.3.9 Restoring Factory Defaults

The factory default settings are shown in the following table:

Parameter	Default Value
Test Mode	Ratio
Test Type	VT/PT
Filter	Normal
Storage Mode	Manual
Language	English
Nameplate	Disable
Nameplate Values	19920:7200 19920:4800 19920:2400 19920:2160 19920:120 7200:2400 7200:2160 7200:120 2400:120 2160:120

Table 4-1

To set the instrument back to the factory default configuration:

1. Turn the DTR® 8510 OFF.
2. Press and hold the ▲ button.
3. Turn the DTR® 8510 ON.
4. Release the ▲ button when the instrument beeps.

NOTE: The previously stored Measurement Records will remain in the memory and the language will remain the same as before the default configuration was loaded.

4.4 Recall Data

1. From the Main Screen, press the ▼ or ▲ key until *Recall Data* appears on the display, then press **ENTER.**

Figure 4-20

The Measurement Record in OBJECT #01 and TEST #01 will be displayed, as well as the Ratio.

NOTE: The V after the Ratio indicates the VT/PT test type. C would be displayed if the Ratio was from a CT test.

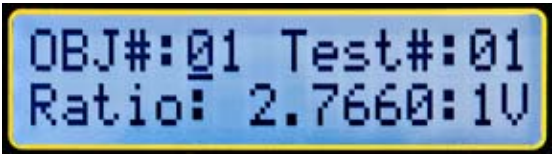


Figure 4-21

2. Press the **TEST** button to move to second screen, which will display Current and Deviation %.

Figure 4-22

3. Press the **TEST** button to move to the third screen to display the Date and Time.

Figure 4-23

4. Press the **TEST** button to move to the fourth screen to display the Primary and Secondary voltages of the Present Nameplate at the time the measurement was made.

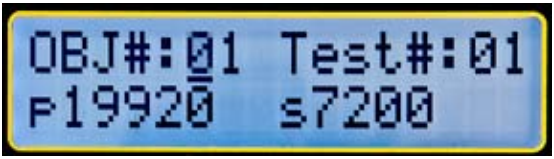


Figure 4-24

5. Press the **TEST** button again to return to the first screen.

6. Select any OBJECT and any TEST using the ▼ or ▲ key and the **ENTER** key to view the Measurement Record at any location.

NOTE:

- The DTR® 8510 can store 99 OBJECTs. Each OBJECT can store up to 99 TESTs.
- In *Manual* mode, the user can select the location to store the Measurement Record. The Measurement Records do not have to necessarily be sequentially stored. So, during a Recall Data operation, it is important for the user to know where the data is
- Appendix B on page 59 provides a form for the user to identify the information stored at each location. The form can be copied and used as needed.

OPERATION

WARNING: The DTR® Model 8510 is designed for use on de-energized ("dead") transformers only. Make sure the test sample is completely disconnected from AC power and is fully discharged.

5.1 Power Up

Turn the power switch to the ON position.

At power up, the instrument goes through an initialization process:

- Beeps once
- Displays "Initializing…Please Wait" for a short duration
- Displays the Company Name and Firmware version number
- Displays Date and Time for a short duration
- The instrument rests at the Main Screen which displays Test Type, Test Mode, Filter, Storage Mode and the present Nameplate values (Fig. 5-1)
- The Green power LED on the front panel turns on solid

Figure 5-1

NOTE:

- If the batteries are insufficiently charged:
  - The Green LED will blink if there is some battery capacity left. The instrument will be operational under this condition.
  - The display will show Low Battery and the Green LED will blink if the battery packs have no capacity left. The instrument cannot be used for testing under these circumstances. The batteries must be recharged before use (see § 8.1).

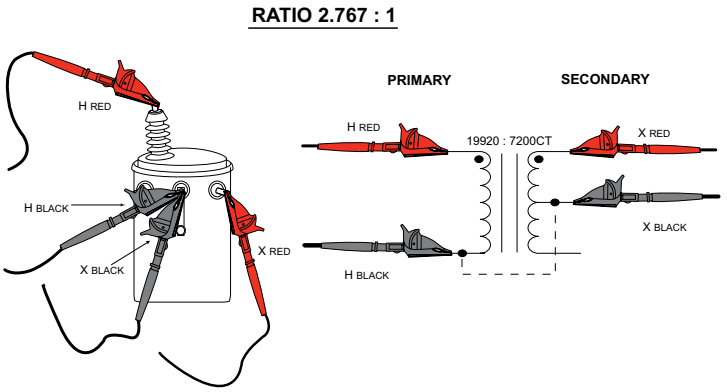
5.2 Running a Test

5.2.1 VT/PT Test

In this section, an example of running a test using the following configuration (see § 4.3 for how to configure the instrument) is shown:

- Set Date/Time: July 4, 2010. 6:00 PM
- Set values in Nameplate:
  Primary Voltage:19920; Secondary Voltage: 7200
- Select Type: VT/PT
- Select Test Mode: CONT/Ratio
- Storage Mode: Manual
- Set Filter: Normal
- Set Language: English

- Typical Connection



- Alternate Connection

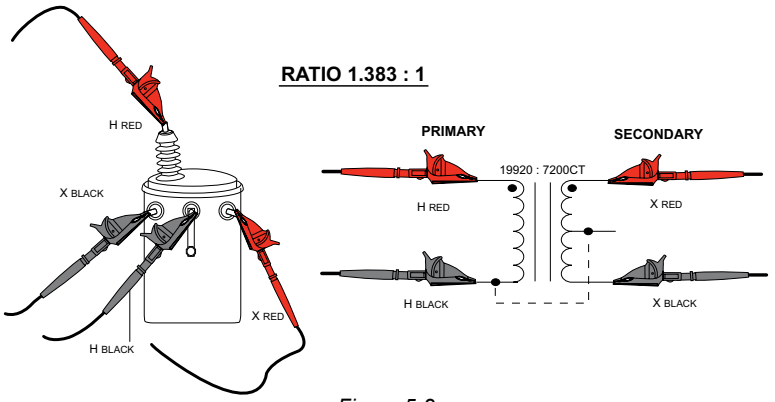


Figure 5-2

1. Connect the Primary (H) and Secondary (X) cables to the appropriate connectors on the DTR® 8510 and the transformer under test (see Fig. 5-2).

2. Press **TEST** button. The test will run continuity first and then run the ratio test.

Figure 5-3

WARNING: It is important to make sure the Primary (H) and the Secondary (X) cables are connected properly **BEFORE** running the test. This is especially true for the high turn-ratio transformers since dangerous high voltage may appear on the DTR® 8510 terminals.

NOTE:

- Continuity checks for the integrity of the cable connections only. It does not check for H/X reverse polarity.

  If the continuity for the Primary connections is within specified limits, the display shows ---- or equivalent to a Closed Switch.

  If the continuity for the Primary connections is outside the specified limits, the display shows --/-- or equivalent to an Open Switch.

- During the Ratio test, the instrument will check for H/X reverse polarity, short (excessive current) etc. before conducting Ratio test.

In this example, the display will appear as shown below.

Figure 5-4

If the H/X were reversed, the instrument will display the following error message and terminate the test.

Figure 5-5

NOTE:

- If there were a polarity reversal, the Ratio would be displayed negative and it would be blinking. This means either the connections are reversed on a given side or the transformer is wound backwards relative to the marking.
- The test may be run as many times as needed by pressing the **TEST** button.
- An active test can be cancelled at any time by pressing the **TEST** button.
- Make sure that the HRED lead is always connected such that it does not short to the XRED or XBLACK lead directly or through earth ground. See § 6 for more connection details.

5.2.2 Storing the Measurement Record (Manual and Auto Mode)

The storage mode you are in depends on what you selected when configuring the instrument (see § 4.3) before running a test.

5.2.2.1 Manual Mode

When *Manual* mode is selected, the Measurement Record storage is optional to the user.

1. To store the active measurement using *Manual* mode, press the **MEM** (ENTER) button. The display looks as shown below:

Figure 5-6

2. Select the OBJ and Test location using the ▼ or ▲ key and press **ENTER**.

3. Press **ENTER** or **TEST** to store the Measurement Record.

NOTE:

- After the test is run, the new location is automatically increased sequentially from the last stored location.
- If a given location is not available for storage, the Save field will display N/A.
- In order to NOT STORE the Measurement Record, simply press the **TEST** button after the measurement is completed.

5.2.2.2 Auto Mode

When *Auto* mode is selected, the instrument requires no user input.

1. At the end of the test, the Measurement Record is stored in the location next to the first available location and then will store sequentially.

NOTE: If the previously stored Measurement Record is encountered, the Auto store mode will skip over and store the new Measurement Record in the next available location.

5.2.3 VT/PT Excitation Current

Excitation current, displayed in milli-amperes (mA) is the RMS current in the Primary (H) winding due to test excitation. The loading on the Secondary (X) winding due to the DTR® 8510 is negligible.

- The DTR® 8510 uses a maximum of 32Vrms excitation voltage for testing. The displayed excitation current will almost always be a small fraction of transformer no-load excitation at full (rated) voltage. Most transformers will require less than 100mA.
- If you are presently using a ratiometer that employs secondary (X) side excitation (e.g. common hand-cranked instruments) in step-up mode, the current may be much higher than what the DTR® 8510 displays.
- This is normal and results directly from the fact that in most step-down transformers, the Primary (H) side has a much higher impedance than its associated Secondary (X) winding.

5.2.4 VT/PT Continuity Test

The Continuity Test function of the DTR® 8510 serves as a useful means of identifying open primary and secondary windings, high resistance connections, open circuit breakers and blown fuses. When selected, the DTR® 8510 checks for continuity between its Secondary (X) and Primary (H) cables.

- The DTR® 8510 will indicate OPEN for circuits >4KΩ and CONT for circuits <4KΩ. Check these values. A small fraction of transformers (High inductance or high winding Ohmic DC resistance) may appear open.
- The instrument checks for Secondary (X) connections first. Even if it is found open, it continues to check Primary (H) connections. Regardless of the outcome, the instrument proceeds to perform pre-test checks. Following the pre-test checks, if either X or H or both were found to be OPEN, the instrument will display the appropriate error message. Pressing the TEST button again will start a new Continuity test (assuming the user fixed the connection problem) again. If it passes the Continuity test, Ratio test will be executed.
- Transformers with winding arrangement multiple, parallel paths (e.g., Delta type) may read CONT even if one or more windings may be OPEN.

5.2.5 CT Test

In this section, an example of running a test using the following configuration (see § 4.3 for how to configure the instrument) is shown:

- Set Date/Time: July 4, 2010. 6:00 PM
- Set values in Nameplate:
  Primary Current:19920; Secondary Current: 7200
- Select Type: CT
- Select Test Mode: Ratio
- Storage Mode: Manual
- Set Filter: Normal
- Set Language: English

Note: CT test does not allow a CONT/Ratio option. It only runs a Ratio test.

WARNING: The DTR® Model 8510 is designed for use on de-energized ("dead") transformers only. Make sure the test sample is completely disconnected from AC power and is fully discharged.

1. Connect the Primary (H) cable to the appropriate connectors on the DTR® Model 8510 and the transformer under test. Connect the Secondary (X) cable as a loop through the current transformer hole as shown in the figure.

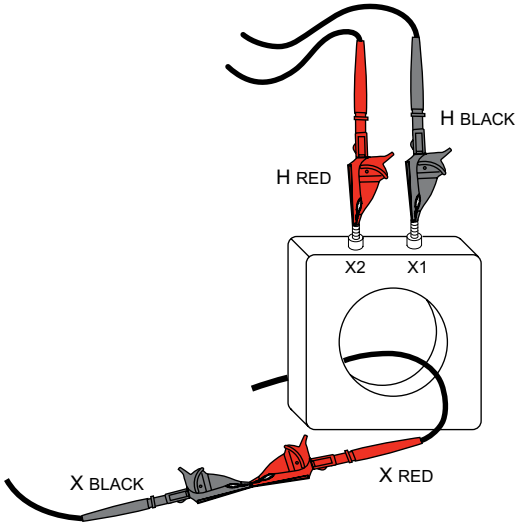


Figure 5-7

2. Press the **TEST** button. During the Ratio test, the instrument will check for H/X reverse polarity, short (excessive current) etc. before conducting Ratio test.

NOTE:

- If the H/X is reversed, the instrument will display the error message (see Fig. 5-5) as in VT/PT test and terminate the test.
- If there were a polarity reversal, the Ratio would be blinking with a negative sign. This means either the connections are reversed on a given side or the transformer is wound backwards relative to the marking.
- The test can be cancelled at any time by pressing the **TEST** button during the operation.
- The CT test ramps up the voltage in steps. At the end of the test, it ramps down the voltage.
- There are certain low mass, low ratio CT's for which the DTR® 8510 may not be able to provide correct ratio. The error message will be "High Excitation Current".

As in VT/PT, the CT test may be run as many times as needed by pressing the **TEST** button.

The measurement records can be saved in *Manual* or *Auto* mode as in VT/PT mode.

The CT remains active until the configuration is changed. Powering the instrument down and turning it back on will not change the Test Type.

5.3 Tips for Making Precise Ratio Measurements

The DTR® Model 8510 is designed for step-down transformers. It sources low voltage on the primary. It starts with a fraction of the final source voltage and checks the secondary voltage.

If it exceeds the primary by a pre-determined value, the safety feature stops the measurement. The recommended procedure is to reverse the leads in these circumstances so that the primary of the transformer is connected to the H cables and the secondary of the transformer is connected to the X cables.

CAUTION: It is important to check that the H cables are connected to the primary side and the X cables are connected to the secondary side of the transformer before the test begins.

- Always verify the integrity of the cable connections and reposition the clips as necessary for robust and low-resistance connections. Inspect the transformer terminals for dielectric coatings, fungus, dirt or corrosion.
- Running a continuity test before the ratio test will provide a useful way to check windings and connections.
- When testing polyphase transformers, keep in mind that in some cases, the measured ratios must be multiplied or divided by $\sqrt{3}$. Refer to § 6 for polyphase connection diagrams and associated ratio equations.

5.4 Ratio Test - 1:1

A simple test can be conducted to test functionality of the DTR® 8510.

1. Connect the HRED to XRED cable and separately connect the HBLACK to XBLACK. This connection simulates a 1:1 transformer.
2. Run VT/PT test.

In this connection mode, the test results should yield a ratio nearly equal to 1.0000. If it does not, the DTR® 8510 may require repair or re-calibration.

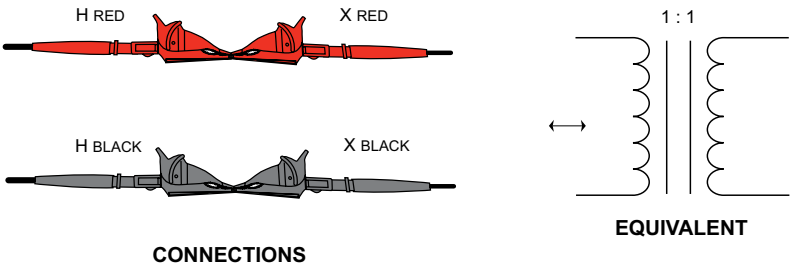


Figure 5-8

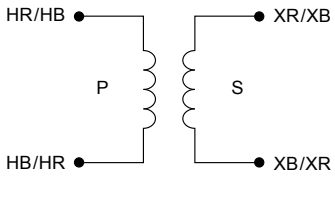
CONNECTIONS

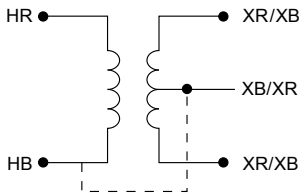
6.1 Connection Diagrams

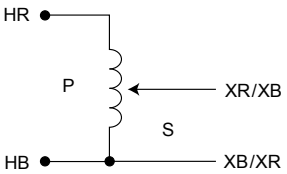
Make sure that the HRED lead is always connected such that it does not short to the XRED or XBLACK lead directly or through earth ground.

In the diagrams below, the top three are good connections but the bottom two should be avoided.

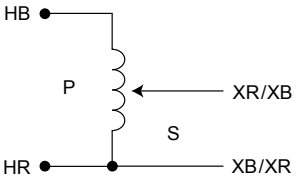
Measurements - OK

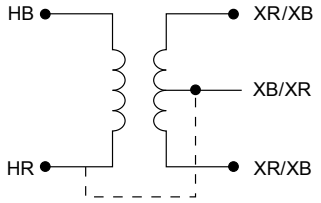




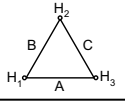
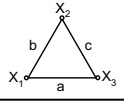
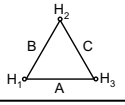
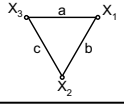
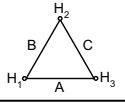
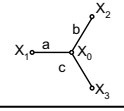
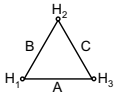
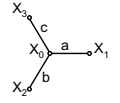
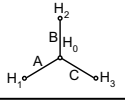
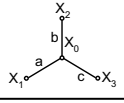
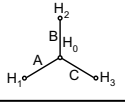
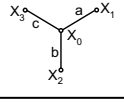
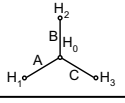
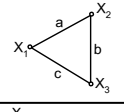
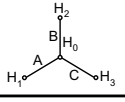
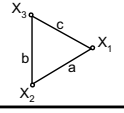


Measurements - NOT OK





6.2 Polyphase Connections

REF NO.	- TRANSFORMER - HIGH VOLTAGE WINDING	- TRANSFORMER - LOW VOLTAGE WINDING	XFMR TYPE	PHASE	HIGH VOLTAGE WINDING	LOW VOLTAGE WINDING	TURNS RATIO
1			1 Ø STD	1 Ø	$H_1 - H_2$	$X_1 - X_2$	$\frac{V_H}{V_X}$
2			Δ - Δ STD	A B C	$H_1 - H_3$ (A) $H_2 - H_1$ (B) $H_3 - H_2$ (C)	$X_1 - X_3$ (a) $X_2 - X_1$ (b) $X_3 - X_2$ (c)	$\frac{V_H}{V_X}$
3			Δ - Δ REV	A B C	$H_1 - H_3$ (A) $H_2 - H_1$ (B) $H_3 - H_2$ (C)	$X_1 - X_3$ (a) $X_2 - X_1$ (b) $X_3 - X_2$ (c)	$\frac{V_H}{V_X}$
4			Δ - Y STD	A B C	$H_1 - H_3$ (A) $H_2 - H_1$ (B) $H_3 - H_2$ (C)	$X_1 - X_0$ (a) $X_2 - X_0$ (b) $X_3 - X_0$ (c)	$\frac{V_H \cdot \sqrt{3}}{V_X}$
5			Δ - Y REV	A B C	$H_1 - H_3$ (A) $H_2 - H_1$ (B) $H_3 - H_2$ (C)	$X_1 - X_0$ (a) $X_2 - X_0$ (b) $X_3 - X_0$ (c)	$\frac{V_H \cdot \sqrt{3}}{V_X}$
6			Y - Y STD	A B C	$H_1 - H_0$ (A) $H_2 - H_0$ (B) $H_3 - H_0$ (C)	$X_1 - X_0$ (a) $X_2 - X_0$ (b) $X_3 - X_0$ (c)	$\frac{V_H}{V_X}$
7			Y - Y REV	A B C	$H_1 - H_0$ (A) $H_2 - H_0$ (B) $H_3 - H_0$ (C)	$X_1 - X_0$ (a) $X_2 - X_0$ (b) $X_3 - X_0$ (c)	$\frac{V_H}{V_X}$
8			Y - Δ STD	A B C	$H_1 - H_0$ (A) $H_2 - H_0$ (B) $H_3 - H_0$ (C)	$X_1 - X_2$ (a) $X_2 - X_3$ (b) $X_3 - X_1$ (c)	$\frac{V_H}{V_X \cdot \sqrt{3}}$
9			Y - Δ REV	A B C	$H_1 - H_0$ (A) $H_2 - H_0$ (B) $H_3 - H_0$ (C)	$X_1 - X_2$ (a) $X_2 - X_3$ (b) $X_3 - X_1$ (c)	$\frac{V_H}{V_X \cdot \sqrt{3}}$

DATAVIEW® SOFTWARE

7.1 Installing DataView®

DO NOT CONNECT THE INSTRUMENT TO THE PC BEFORE INSTALLING THE SOFTWARE AND DRIVERS.

Minimum Computer Requirements:

- Windows XP / Windows Vista & Windows 7 (32/64 bit)
- 256MB of RAM for Windows XP
  1GB of RAM for Windows Vista & Windows 7 (32 bit)
  2GB or RAM for Windows Vista & Windows 7 (64 bit)
- 80MB of hard disk space (200MB recommended)
- CD-ROM drive

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

NOTE: When installing, the user must have Administrative access rights during the installation. The users access rights can be changed after the installation is complete.

Be sure to select the "all users" option during installation if different users need to access the software on the same computer.

1. Insert the DataView® CD into your CD-ROM drive.
   If auto-run is enabled, the Setup program will start automatically. If auto-run is not enabled, select Run from the Start menu and type in **D:\SETUP** (if your CD-ROM drive is drive D. If this is not the case, substitute the appropriate drive letter).

NOTE: If installing onto a Vista/Windows 7 computer, the **User Account Control** dialog box may appear. Select the **Allow** option to proceed.

2. A **Set-up** window, similar to the one below, will appear.

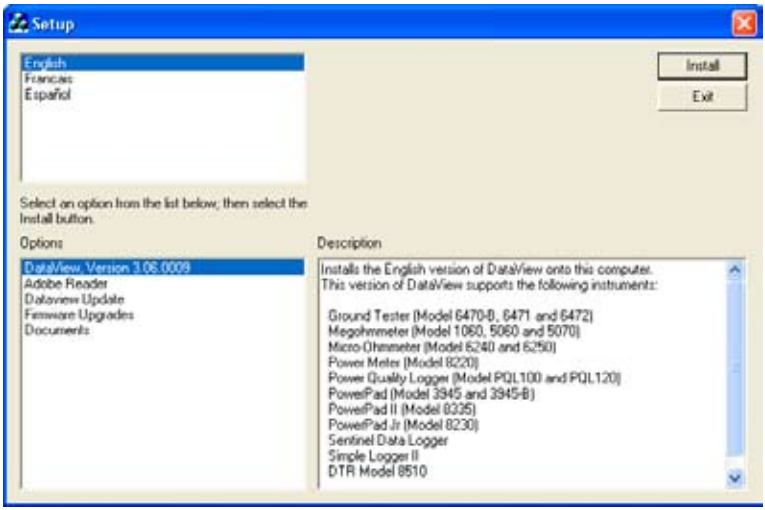


Figure 7-1

There are several different options to choose from. Some options(*) require an internet connection.

- **DataView, Version x.xx.xxxx** - Installs DataView® onto the PC.
- ***Adobe Reader** - Links to the Adobe® website to download the most recent version of Adobe® Reader to the computer. *Adobe® Reader is required for viewing PDF documents supplied with DataView® that are accessible from the Help menu.*
- ***DataView Updates** - Links to the online AEMC® software updates to check for new software version releases.
- ***Firmware Upgrades** - Links to the online AEMC® firmware updates to check for new firmware version releases.
- **Documents** - Shows a list of instrument related documents that you can view. Adobe® Reader is required for viewing PDF documents supplied with DataView®.

3. **DataView, Version x.xx.xxxx** option should be selected by default. Select the desired language and then click on **Install**.

4. The **Installation Wizard** window will appear. Click **Next**.

5. To proceed, accept the terms of the license agreement and click **Next**.

6. In the **Customer Information** window, enter a Name and Company, then click **Next**.

7. In the **Setup Type** window that appears, select the **"Custom"** radio button option, then click **Next**.

NOTE: DataView® is common to several AEMC® Instruments products.

8. In the **Custom Setup** window that appears, select the instrument control panel that you want to install by clicking on the Red X icon and selecting the option "Will be installed on local hard drive" from the list, then click **Next**.

NOTE: The **PDF-XChange** option must be selected to be able to generate PDF reports from within DataView®.

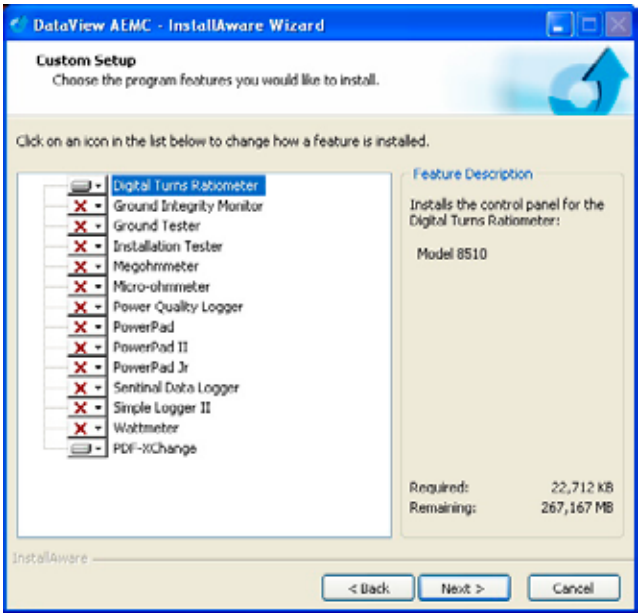


Figure 7-2

NOTE: Shortcuts for DataView® and each instrument control panel selected during the installation process will be added to your desktop. You can add another instrument at any time.

9. The **Destination Folder** window appears. Keep the install location at the default of Program Files and click **Next.**

10. In the **Select Program Folder** window that appears next, select the **(all users)** radio button if more than one person will need to access the software on the same computer. Click **Next**.

11. In the **Completing the Install Wizard for DataView** window, click on **Next** and the installation will begin.

12. If the instrument selected for installation requires the use of a USB port, a warning box will appear, similar to Figure 7-3. Click **OK**.

Figure 7-3

NOTE: The installation of the drivers may take a few moments. Windows may even indicate that it is not responding, however it is running. Please wait for it to finish.

15. A **Question** dialog box appears next. Click **Yes** to read the procedure for connecting the instrument to the USB port on the computer.

16. Next, the **Installation Wizard Complete** window will appear. Click on **Finish**.

NOTE: The Set-up window remains open. You may now select another option to download (e.g. Adobe® Reader), or close the window.

17. **Restart** your computer, then connect the instrument to the USB or Serial port on the computer.

18. Once connected, the **Found New Hardware** dialog box will appear. Windows will complete the driver installation process automatically.

NOTE: If you connected your instrument to the computer before installing the software and drivers, you may need to use the **Add/Remove Hardware** utility to remove the instrument driver before repeating the process.

7.2 Opening the Control Panel

The Control Panel can be opened from the DTR icon or from DataView®.

To open the Control Panel using the desktop icon:

- Double-click the **DTR Icon** that was created during installation, located on the desktop.
- The **Connection** window will appear. Click **OK**.

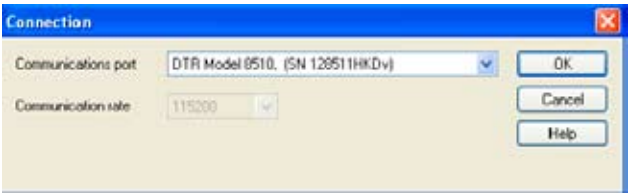


Figure 7-4

To open the Control Panel from DataView®:

Double-click on the **DataView icon** on your desktop. The DataView® splash screen with a logo and relevant information will be displayed for a few seconds and then the Quick Start dialog box will appear (see Fig. 7-5).

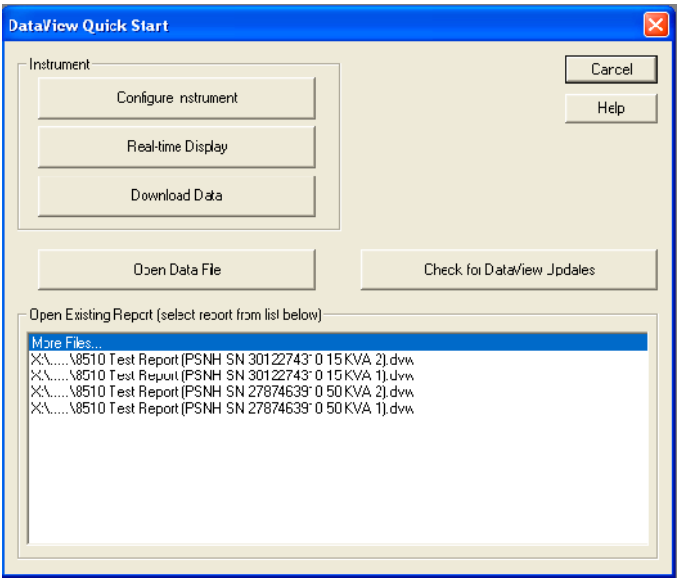


Figure 7-5

Select **Configure Instrument**. The Select Instrument dialog box will appear.

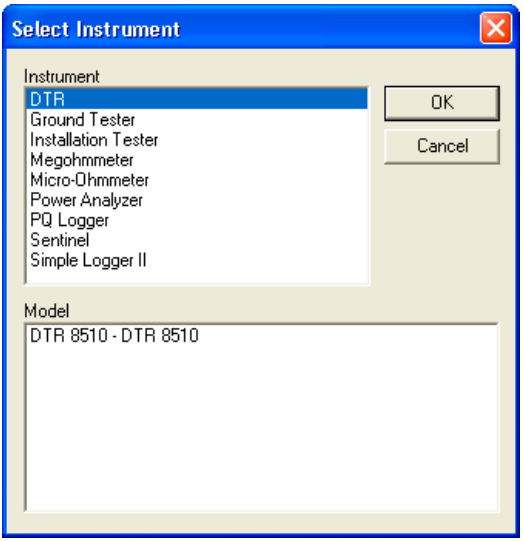


Figure 7-6

Select **DTR** and press **OK**. The Connection dialog box will appear (see Fig. 7-4).

The Connection window specifies the connected instrument in the communications drop-down list.

If multiple units are attached, select the desired unit with its associated serial number from the drop-down list.

Once the desired instrument has been selected, click **OK** and the DTR® 8510 Control Panel and Configuration window will open (see Fig. 7-8).

7.3 Using the Control Panel

The **Control Panel** is used for instrument operation and configuration.

To open the Control Panel refer to § 7.2.

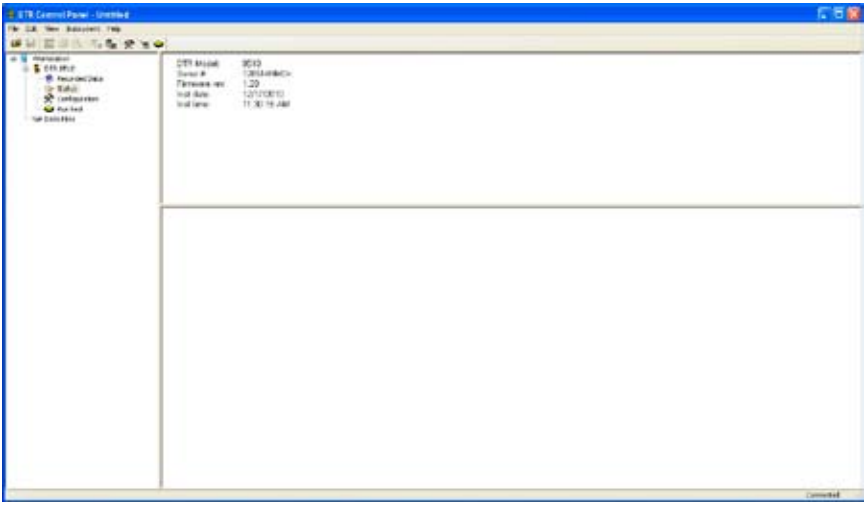


Figure 7-7

The main menu at the top of the screen lists the following commands:

File

Open - Opens a DTR *.icp file

Save - Saves the report file in the appropriate folder

Save as - Permits the user to save the report at the location of his choice

Create DataView Report - Generates report for the open test results

Print Test - Prints the result of the test

Print Preview - Provides a preview of the selected test to be printed

Print All Tests - Prints all the tests in the selected Object

Print - Prints the selected real-time window

Print Preview All Tests - Provides a preview of all tests to be printed

Print Setup - Displays a Print Setup window allowing you to select a destination printer and change various printing options

Exit - Closes the control panel

Edit

Edit - Edits the session information for the selected test in the opened *.icp file

Delete - Deletes the current test from the *.icp file

View

Toolbar - Allows selection to view the toolbar

Status bar - Allows selection to view the status bar

Split - Allows splitting the screen to view the information

Instrument

Connect - Establishes a connection with the instrument

Disconnect - Closes the connection with the instrument

Configure - Displays the instrument configuration window

Download - Downloads recorded data stored in the DTR® 8510

Run Test - Allows running a test from the computer

Help

Help Topics - Displays the Control Panel help topic

About DTR - Displays a dialog box providing the current version number of the DTR® 8510 and DataView® software

7.4 Configuring the DTR® 8510

To Configure the DTR® 8510, perform the following steps:

1. Open the **Control Panel** and connect to the instrument. To open the Control Panel refer to § 7.2
2. Next, select **Configure** from the **Instrument** menu or click on the Configure icon . The Configure Instrument dialog box will be displayed.

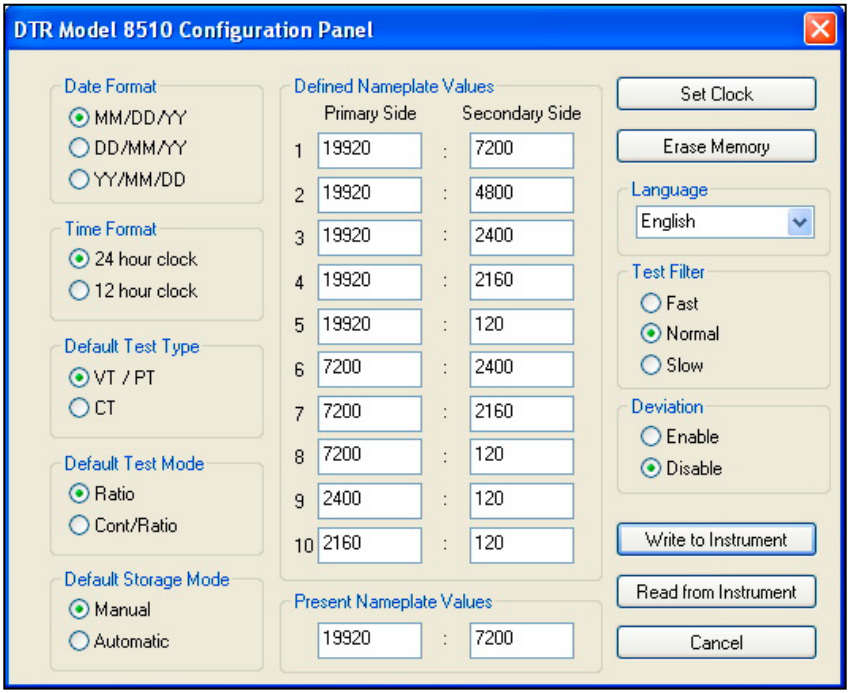


Figure 7-8

Date Format: Allows selection of the Date Format as MM/DD/YY or DD/MM/YY or YY/MM/DD.

Time format: Allows selection of Time format as 24-hour or 12-hour format.

Default Test Type: Allows selection of VT/PT or CT test.

Default Test Mode: Allows selection of test for Ratio only or Cont/Ratio (Continuity and Ratio) mode.

Default Storage Mode: Allows selection of storage of each Measurement Record in Manual or Automatic mode.

Default Nameplate Values: Allows the user to store the most frequently used nameplate values (or ratio values).

Present Nameplate Values: Allows the selection of the present nameplate values. The Deviation (%) will be calculated based on the Present Nameplate values for each measurement.

Set Clock: Allows setting the clock on the instrument manually or synchronized with the clock in the computer.

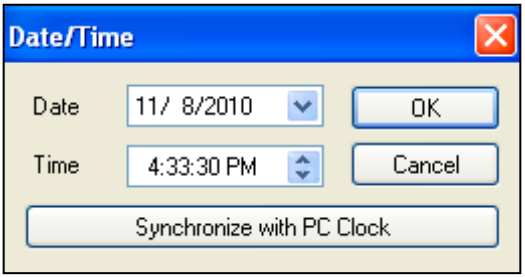


Figure 7-9

Erase Memory: Allows the memory to be completely erased.

Language: Allows the selection of English, French, German, Italian or Portuguese.

Write To Instrument: Allows the present configuration values to be written in the instrument.

NOTE: None of the changes made on the configuration screen take effect until Write to Instrument command is executed.

Read from Instrument: Allows the present configuration to be read.

Cancel: Cancels the process to modify the configuration and closes the dialog box.

NOTE: Parameters changed after Write to Instrument was executed will be lost.

7.5 Running a Test

1. Open the **Control Panel** and connect to the instrument.
2. Next, select **Run Test** from the **Instrument** menu or click on the **Run Test icon** on the side or top menu.

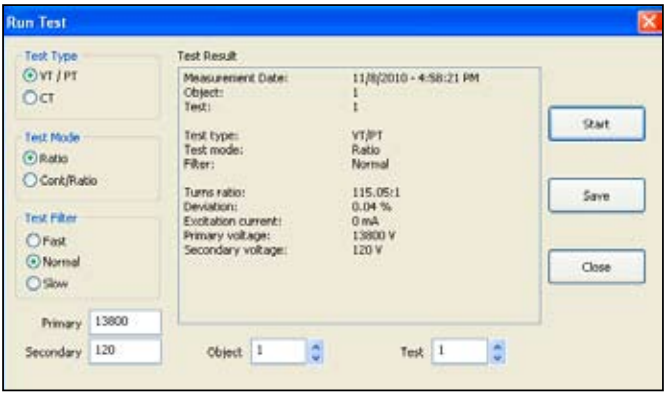


Figure 7-10

The user can select **Test Type, Test Mode, Test Filter, Present Nameplate values** and where the **Measurement Record** would be stored.

3. Press **Start** to run the test. The result (Measurement Record) of the Test will be displayed in the center.

NOTE:

- If the DTR® 8510 is in Autosave mode, the connection to the computer will disable the automatic saving of the Measurement Record.
- If the Test needs to be cancelled while testing is in progress, press the **TEST** button on the instrument or **CANCEL** button on the screen.
- If new Test Type, Test Mode, test Filter and/or Present Nameplate values are selected, the Configuration will be changed to reflect them in this and the following tests.

4. Press **Save** to save the Measurement Record in the selected Object and Test locations, then press **Close** to close the dialog box.

NOTE: Pressing **Save** in the dialog box only saves the test to the instrument, NOT the computer. To save the test on the computer, select **Save** from the **File** menu.

7.6 Downloading a Test

This selection permits downloading of the stored Measurement Records from the instrument.

To download a test:

1. Click on the **Download icon** in the toolbar, or click on **Recorded Data** on the side menu. The **Select Tests** dialog box will appear:

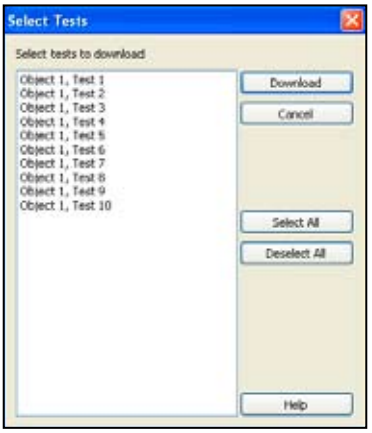


Figure 7-11

This dialog box displays the content of the memory. No Measurement Records are downloaded as yet.

2. Select the Measurement Records individually or press **Select All**. Press **Download** to get the data to the computer.

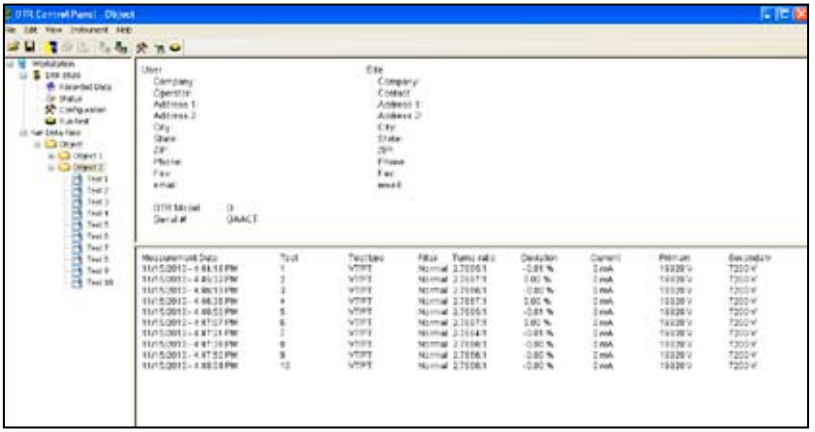


Figure 7-12

7.7 Saving the Measurement Records

1. Select **Save** or **Save As** from the **File** menu. The Save As dialog box will appear:

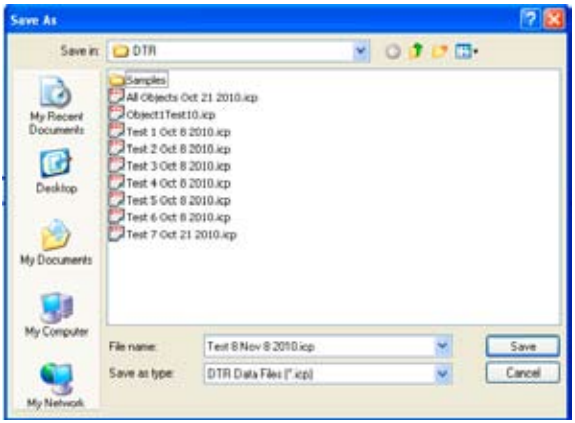


Figure 7-13

2. Save the file in the default location of "My Documents\DataView\Data-Files\DTR" or select a different folder to save to.

7.8 Report Generation

To generate a report, a file needs to be open.

1. Select **Open** from the **File** menu. If necessary, navigate to the appropriate folder where the .icp file is located, select it and press **Open**.

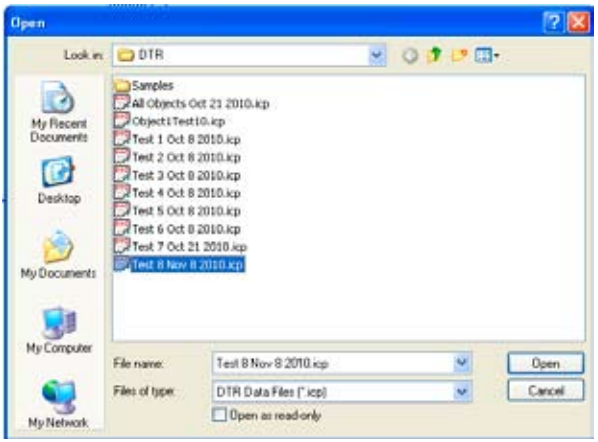


Figure 7-14

Once the file is open, select **Create DataView Report** from the **File** menu or click on the **Create DataView Report** icon. A report will appear on the screen.

Index	Date	Time	Object Name	Name	Turns Ratio	Deviation	Current	Primary	Secondary
1	11/15/2010	4:44:18.000 PM	Object	Test 1	2.7665:1	-0.01 %	0 mA	19920 V	7200 V
2	11/15/2010	4:45:32.000 PM	Object	Test 2	2.7667:1	0.00 %	0 mA	19920 V	7200 V
3	11/15/2010	4:46:19.000 PM	Object	Test 3	2.7666:1	-0.00 %	0 mA	19920 V	7200 V
4	11/15/2010	4:46:36.000 PM	Object	Test 4	2.7667:1	0.00 %	0 mA	19920 V	7200 V
5	11/15/2010	4:46:50.000 PM	Object	Test 5	2.7665:1	-0.01 %	0 mA	19920 V	7200 V
6	11/15/2010	4:47:07.000 PM	Object	Test 6	2.7667:1	0.00 %	0 mA	19920 V	7200 V
7	11/15/2010	4:47:21.000 PM	Object	Test 7	2.7664:1	-0.01 %	0 mA	19920 V	7200 V
8	11/15/2010	4:47:36.000 PM	Object	Test 8	2.7666:1	-0.00 %	0 mA	19920 V	7200 V
9	11/15/2010	4:47:50.000 PM	Object	Test 9	2.7666:1	-0.00 %	0 mA	19920 V	7200 V
10	11/15/2010	4:48:04.000 PM	Object	Test 10	2.7666:1	-0.00 %	0 mA	19920 V	7200 V

Figure 7-15

NOTE:

- All downloaded files and reports are saved in the default location of "My Documents" or "Documents" for each user.
- DataView® and Control Panel (CP) are fully integrated programs for instrument control and data analysis/report generation. CP can download the Measurement Records previously stored in the DTR® 8510 memory. These Measurement Records can be stored in the *.icp format. Reports can be generated by a single click on the “icon” or **create DataView Report** from the **File** menu. When a report is created, a database file *.dvb is automatically created.
- DataView® can also call the CP or the CP of other instruments.
- DataView® cannot open *.icp files.
- When a report is created from the CP, a report can be stored. In the process a *.dvw file is generated.
- DataView® can also create a report from the available database files. A *.dvb file is automatically created when the CP creates a report from *.icp file.
- When a report is created, a *.dvw file is created. This report can be directly opened from DataView®.

NOTE: For more information about using DataView®, refer to the DataView® manual that is included on the installation CD. This manual can also be found online at www.aemc.com on our software download page for DataView®.

MAINTENANCE

- Use only factory specified replacement parts. AEMC® will not be held responsible for any accident, incident, or malfunction following a repair done other than by its service center or by an approved repair center.

WARNING: To avoid electrical shock, do not perform any service other than the operating instructions contained in this manual, unless you are qualified to do so.

- Do not allow water or other foreign substances into the case.
- Disconnect the unit from all circuits and test cables before opening the case.
- Use caution with metallic tools that may short battery packs, power supplies, etc.

8.1 Charging the Batteries

The DTR® 8510 is supplied with an external smart charging unit. In order to charge the NiMH battery packs, the instrument switch must be in the OFF/ CHARGE position.

Connect the charger unit output cable to the 3-pin DIN connector on the front panel of the instrument and connect the AC power cord to the AC receptacle.

The charging starts as soon as the power is applied, the process is automatic and will terminate on its own upon completion.

CAUTION:

- Do not use any other charger.
- Do not connect DC power supply. Damage will occur to the instrument.

- The DTR® 8510 must be charged indoors.
- Disconnect the charger upon completion of the charging process. NiMH battery manufacturers do not allow trickle charge for a long time on a recurring basis.

Note:

- The DTR® 8510 Power Switch must be in the OFF/CHARGE position in order for the unit to charge.
- The DTR® 8510 cannot be used to test while it is charging.
- There is no indication on the front panel about the status of charging or its completion. The Status LED is on the charger unit itself (see Figure 8-1).

Figure 8-1

Charge Cycle and Status LED Indication on the Charger	
LED	**MODE**
Orange	Battery not connected
Orange	Battery initialization & analysis
Red	Fast Charge
Green with Intermittent Orange Flash	Top-off charge
Green	Trickle charge
Alternating Red-Green	Error

Table 8-1

The smart charger has the following features:

- **Multiple charge detection methods -dV (typical) and dT/dt.**
  Typically, the indication that the battery is fully charged is detected by a slight drop in its voltage (-dV). However, if the batteries are unused for a long time, they may display the same drop in voltage in the early part of the charge cycle even if they are not fully charged. This is a false indication. In order to prevent the termination of charge cycle due to this false indication, there is an integral timer built in the charger which will disregard the –dV for the first minutes of the charge cycle.

  The battery packs are built with a thermistor. The smart charger constantly monitors the battery pack temperature. A built-in temperature charge control (+dT/dt) secures optimal charge.

- **Safety timer termination.**
  In case the batteries do not exhibit sufficient –dV/dt for the charger to detect, there is an internal safety timer which is custom-programmed for the battery packs used in the DTR® Model 8510.

- **Fast charging cycle.**
  This charge cycle supplies a maximum 900mA charge until -dV is detected.

- **Integral start timer to prevent initial, false -dV detection.**
  A few battery cells may have a voltage drop (-dV) in the first part of the charge cycle. This is especially true for battery cells which have been idle for a long period of time. Because of this, a start-timer built into the charger prevents -dV detection in the first minutes of the charger cycle.

- **Reverse polarity/short circuit protection.**
  The charger is protected against reverse polarity by an automatically resettable polyswitch fuse on the output.

- **LED status indicator** (see Table 8-1 on page 54)**.**

- **Universal input voltage.**
  With the use of a proper power cord, the charger can be connected to standard AC receptacle anywhere in the world without the need for an external transformer.

Functionality:

Charging begins when the charger is connected to the DTR® 8510 and the power switch is in the OFF position. The LED will be orange before the fast charge starts. The LED will change to red when the fast charge cycle begins. When the cells are fully charged and the voltage drops (because of the -dV signal from the cells), the charger will go into a top-off charge mode before switching to trickle charge mode.

During the top-off charge session, the LED will be green with short, intermittent orange flashes. When the top-off charge is complete, the charger will go into trickle charge mode, changing the LED color to green. The charge current is now reduced to a safe level. However, trickle charging in excess of 12 hours on routine basis could be damaging for NiMH batteries.

If the safety timer disconnects before -dV, the top-off charge will not be engaged. The charger will then go directly to trickle charge mode and the LED will turn green. If the battery voltage is far below normal, the charger will stop the fast charge current and switch to trickle charge mode. The LED will then indicate an "error" by flickering green and red. The battery packs and/or the charger may need to be replaced.

If the line power is turned off, the charger will reset and start a new charge cycle when it is turned on again.

8.2 Cleaning

Disconnect the instrument from any source of electricity.

- Use a soft cloth lightly moistened with soapy water.
- Wipe with a moist cloth and then dry with a dry cloth.
- Never use alcohol, solvents or hydrocarbons.

DISPLAY MESSAGES

Check for H<>X Cable Reversal

The DTR® Model 8510 may have detected a potentially hazardous step-up condition while attempting to test the transformer as connected. Verify connections.

High Excitation Current

Check test cable connections for inadvertent short circuits. Check for shorted transformer windings.

Low Battery

As the batteries are drained during use, the green LED will begin to flash when the battery voltage reaches a pre-determined threshold. The tests can be run as usual during this time but the batteries will soon need to be charged.

As the batteries reach a predetermined threshold, LOW BATTERY indication will appear on the display. All the buttons will be non-operational now. The batteries must be recharged in order to continue testing.

NOTE: The DTR® Model 8510 charges in <4 hours. The instrument can not be used to test when the batteries are charging.

X Circuit CONT or OPEN

The ------ indication is for CONT (Closed switch). It indicates a good connection.

The --/-- indication is for OPEN (Open switch). It indicates a poor or open connection.

The message “Check X Connection” will be displayed.

H Circuit CONT or OPEN

The ------ indication is for CONT (Closed switch).

The --/-- indication is for OPEN (Open switch)

The message “Check H Connection” will be displayed.

Note: If both H and X connections are open, “Check H X connection” will be displayed.

Low X Signal

Check Secondary (X) cables for inadvertent short.

Check to make sure the Secondary (X) cable is connected properly at the instrument panel.

Secondary (X) winding may be shorted or the transformer circuit breaker may be open or the ratio may be higher than the instrument can measure.

Low H Signal

Check Primary (H) cables for inadvertent short.

Check to make sure the Primary (H) cable is connected properly at the instrument panel.

Primary (H) winding may be shorted.

Memory is Full! Data NOT stored

The instrument memory is full and there is no more location left for additional storage.

Memory Error
Service Required

Measurement Records cannot be stored or recalled because the memory cannot be accessed. Factory service is needed. However, the DTR® 8510 can be used to make measurements in a normal manner.

APPENDIX B

Transformer Serial Number Correlation to Object Number		
Object # (1 - 99)	Transformer Serial #	# of Tests in Object (1 - 99)

Repair and Calibration

To ensure that your instrument meets factory specifications, we recommend that it be scheduled back to our factory Service Center at one-year intervals for recalibration, or as required by other standards or internal procedures.

For instrument repair and calibration:

You must contact our Service Center for a Customer Service Authorization Number (CSA#). This will ensure that when your instrument arrives, it will be tracked and processed promptly. Please write the CSA# on the outside of the shipping container. If the instrument is returned for calibration, we need to know if you want a standard calibration, or a calibration traceable to N.I.S.T. (Includes calibration certificate plus recorded calibration data).

Ship To: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive
Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
(603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

(Or contact your authorized distributor)

Costs for repair, standard calibration, and calibration traceable to N.I.S.T. are available.

NOTE: You must obtain a CSA# before returning any instrument.

Technical and Sales Assistance

If you are experiencing any technical problems, or require any assistance with the proper operation or application of your instrument, please call, mail, fax or e-mail our technical support team:

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
200 Foxborough Boulevard
Foxborough, MA 02035 USA
Phone: (800) 343-1391
(508) 698-2115
Fax: (508) 698-2118
E-mail: techsupport@aemc.com
www.aemc.com

NOTE: Do not ship instruments to our Foxborough, MA address.

Limited Warranty

The DTR® Model 8510 is warranted to the owner for a period of one year from the date of original purchase against defects in manufacture. This limited warranty is given by AEMC® Instruments, not by the distributor from whom it was purchased. This warranty is void if the unit has been tampered with, abused or if the defect is related to service not performed by AEMC® Instruments.

For full and detailed warranty coverage, please read the Warranty Coverage Information, which is attached to the Warranty Registration Card (if enclosed) or is available at www.aemc.com. Please keep the Warranty Coverage Information with your records.

What AEMC® Instruments will do:

If a malfunction occurs within the one-year period, you may return the instrument to us for repair, provided we have your warranty registration information on file or a proof of purchase. AEMC® Instruments will, at its option, repair or replace the faulty material.

REGISTER ONLINE AT:
www.aemc.com

Warranty Repairs

What you must do to return an Instrument for Warranty Repair:

First, request a Customer Service Authorization Number (CSA#) by phone or by fax from our Service Department (see address below), then return the instrument along with the signed CSA Form. Please write the CSA# on the outside of the shipping container. Return the instrument, postage or shipment pre-paid to:

Ship To: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
(603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

Caution: To protect yourself against in-transit loss, we recommend you insure your returned material.

NOTE: You must obtain a CSA# before returning any instrument.

12/10

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Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA • Phone: (603) 749-6434 • Fax: (603) 742-2346
www.aemc.com